

WHAT IS CLAIMED IS:

1. A method of manufacturing an electronic device, comprising the steps of:
 - (a) forming a barrier layer containing a Ti atom on an underlying layer;
 - 5 (b) forming a lower Ti metal layer on said barrier layer;
 - (c) forming an AlCu layer on said lower Ti metal layer;
 - (d) forming a cap layer containing a Ti atom on said AlCu layer;
 - (e) conducting heat treatment on an AlCu alloy interconnect line formed through said steps (a) to (d) to form a lower AlTi alloy layer in a lower portion of said AlCu layer;
 - 10 (f) forming an interlayer dielectric film on said AlCu alloy interconnect line subjected to heat treatment;
 - (g) forming a via hole so as to extend through said interlayer dielectric film and said cap layer to reach said lower AlTi alloy layer in said lower portion of said AlCu layer;
 - 15 (h) forming a via hole barrier layer containing a Ti atom on an inner surface of said via hole; and
 - (i) filling a plug material inside said via hole barrier layer to form a plug.
2. A method of manufacturing an electronic device, comprising the steps of:
 - (a) forming a barrier layer containing a Ti atom on an underlying layer;
 - (b) forming a lower Ti metal layer on said barrier layer;
 - (c) forming an AlCu layer on said lower Ti metal layer;
 - (d) forming a cap layer containing a Ti atom on said AlCu layer;
 - 20 (e) conducting heat treatment on an AlCu alloy interconnect line formed
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through said steps (a) to (d) to form a lower AlTi alloy layer in a lower portion of said AlCu layer;

(f) forming an interlayer dielectric film on said AlCu alloy interconnect line subjected to heat treatment;

5 (g-1) forming a via hole so as to extend through said interlayer dielectric film and said cap layer to reach said AlCu layer;

(g-2) forming a via hole Ti metal layer on an inner surface of said via hole;

(h) forming a via hole barrier layer containing a Ti atom on an inner surface of said via hole Ti metal layer;

10 (i) filling a plug material inside said via hole barrier layer to form a plug; and

(i-1) conducting heat treatment to form an upper AlTi alloy region in an upper portion of said AlCu layer from said AlCu layer and said via hole Ti metal layer.

3. A method of manufacturing an electronic device, comprising the steps of:

15 (a) forming a barrier layer containing a Ti atom on an underlying layer;

(b) forming a lower Ti metal layer on said barrier layer;

(c) forming an AlCu layer on said lower Ti metal layer;

(c-1) forming an upper Ti metal layer on said AlCu layer;

(d-1) forming a cap layer containing a Ti atom on said upper Ti metal layer;

20 (e-1) conducting heat treatment on an AlCu alloy interconnect line formed through said steps (a) to (d-1) to form an upper AlTi alloy layer in an upper portion of said AlCu layer and a lower AlTi alloy layer in a lower portion of said AlCu layer;

(f) forming an interlayer dielectric film on said AlCu alloy interconnect line subjected to heat treatment;

25 (g-3) forming a via hole so as to extend through said interlayer dielectric film to

reach said cap layer;

(h) forming a via hole barrier layer containing a Ti atom on an inner surface of said via hole; and

(i) filling a plug material inside said via hole barrier layer to form a plug.

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4. The method according to claim 2, wherein
said steps (i) and (i-1) are performed in the same step.

5. The method according to claim 1, wherein
10 said step (e) includes the step of conducting heat treatment on said AlCu layer and said cap layer in an N₂ atmosphere at a temperature between 400 and 450°C for a time period between 15 and 30 minutes.

6. The method according to claim 2, wherein
15 said step (e) includes the step of conducting heat treatment on said AlCu layer and said cap layer in an N₂ atmosphere at a temperature between 400 and 450°C for a time period between 15 and 30 minutes.

7. The method according to claim 3, wherein
20 said step (e-1) includes the step of conducting heat treatment on said AlCu layer and said cap layer in an N₂ atmosphere at a temperature between 400 and 450°C for a time period between 15 and 30 minutes.

8. The method according to claim 1, wherein
25 said lower AlTi alloy layer has a thickness equal to or greater than one quarter

of a thickness of said AlCu layer.

9. The method according to claim 2, wherein

said lower AlTi alloy layer has a thickness equal to or greater than one quarter

5 of a thickness of said AlCu layer.

10. The method according to claim 3, wherein

said lower AlTi alloy layer has a thickness equal to or greater than one quarter

of a thickness of said AlCu layer.